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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,914	03/02/2004	Fengxia Qi	UAB-17404/22	1392

25006 7590 08/04/2009

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ART UNIT	PAPER NUMBER
1645	

MAIL DATE	DELIVERY MODE
08/04/2009	PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte FENGXIA QI, PAGE W. CAUFIELD,
and PING CHEN

Appeal 2009-001908
Application 10/790,914
Technology Center 1600

Decided: August 4, 2009

Before TONI R. SCHEINER, LORA M. GREEN,
and JEFFREY N. FREDMAN, *Administrative Patent Judges*.

FREDMAN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a method of treating a gram-positive infection, which the Examiner has rejected on grounds of enablement and anticipation. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

Statement of the Case

Background

"Production of mutacins by *S. mutans* and other oral streptococci may also play a protective role to the host against pathogens such as Group A

streptococci and *Streptococcus pneumoniae*. In this respect, mutacins may serve as antimicrobial agents in the future" (Spec. 2, ll. 6-9).

The Claims

Claims 9-28 are on appeal. We will focus on claim 9 which is representative and reads as follows:

> 9. A method of treating or preventing a gram-positive infection in a subject, said method comprising administering to said subject an effective amount of a purified and isolated peptide having the amino acid sequence as set forth in SEQ ID No: 2, or a pharmaceutically acceptable salt, amide, ester, or prodrug thereof.

The Prior Art

The Examiner relies upon the following prior art references to show unpatentability:

O'Brien et al., *Recognition and management of bioterrorism infections*, 67 AMERICAN FAMILY PRACTICE 1927-1934 (2003).

Koch et al., *Enterococcal Infections: host response, therapeutic and prophylactic possibilities*, 22 VACCINE 822-830 (2004).

Ooshima et al., *Effect of Mutacin Administration on Streptococcus mutans-Induced Dental Caries in Rats*, 29 MICROBIOL. IMMUNOL. 1163-1173 (1985).

Ikeda et al., *Purification and Certain Properties of a Bacteriocin from Streptococcus mutans*, 35 INFECTION AND IMMUNITY 861-868 (1982).

The Issues

The rejections as presented by the Examiner are as follows:

A. The Examiner rejected claims 9-28 under 35 U.S.C. § 112, first paragraph as failing to comply with the enablement requirement (Ans. 3-7).

B. The Examiner rejected claims 9-10 under 35 U.S.C. § 102(b) as anticipated by Ikeda (Ans. 7-8).

C. The Examiner rejected claims 9-10 under 35 U.S.C. § 102(b) as anticipated by Ooshima (Ans. 7-8).

A. 35 U.S.C. § 112, first paragraph Enablement

The Examiner finds that the "specification has not shown that mutacin I can be used to treat or prevent infections caused by all gram-positive microorganisms. The claimed invention broadly encompasses any infection or disease caused by any gram-positive microorganism" (Ans. 5).

Appellants contend that "the enablement rejection under review lacks the required information showing that one of skill in the art would not know how to make and use the claimed invention with reference to any particular gram-positive organism" (App. Br. 11).

In view of these conflicting positions, we frame the enablement issue before us as follows:

Have Appellants demonstrated that the Examiner erred in finding that it would have required undue experimentation to treat or prevent gram-positive infections in a subject using the peptide of SEQ ID NO: 2?

Findings of Fact (FF)

Breadth of Claims

1. Claim 9 is drawn to the treatment of "gram-positive infection" without limitation as to type of infection or type of organism (see claim 9).

2. The Examiner finds that "[t]he claimed invention encompasses a method of treating or preventing all gram-positive bacterial infections" (Ans. 4).

Amount of Direction or Guidance Presented

3. The Specification teaches that "[m]utacin I has the following advantages over conventional antimicrobial agents: 1) it has a wide spectrum of antimicrobial activity against a wide range of gram-positive bacteria including the multidrug-resistant Staphylococci and Enterococci, the major culprits of IVC-related infections" (Spec. 18, ll. 1-5).

4. The Specification teaches that because mutacin I "is produced by a normal member of the human oral biota, it is unlikely to elicit immune response from the patient or has any toxicity to the host" (Spec. 18, ll. 10-12).

5. The Specification teaches that "[m]utacins are active against closely related species as well as a surprisingly wide spectrum of other Gram-positive bacteria. Parrot et al. (1990) *Can. J. Microbiol* 36:123-130)" (Spec. 1, l. 24 to 2, l. 3).

Working Examples

6. The Examiner finds that "there are no working examples in the instant specification that demonstrate effectiveness of the peptide against all gram-positive microbial infections" (Ans. 6).

State of the Art and Unpredictability of the Art

7. The Examiner finds that "O'Brien et al has taught that gram-negative bacteria can be quite difficult to diagnosis as well as manage infections caused by these organisms" (Ans. 5).

8. The Examiner makes no finding that it would have been unpredictable to determine whether mutacin would function to treat disease.

Caulfield Declaration

9. The Caulfield Declaration teaches that "[m]utacin I proved highly effective against streptococci, effective against vancomycin-resistant *Enterococcus*, and of varying efficacy against multiple resistant Staph aureus depending on the concentration and purity of the preparation" (Caulfield Declaration ¶ 6).

10. The Caulfield Declaration teaches that "semi-purified mutacin I, II, and III were found effective on an overlayer of *Bacillus anthracis* Sterne" (Caulfield Declaration ¶ 6).

Principles of Law

"In order to satisfy the enablement requirement of section 112, an applicant must describe the manner of making and using the invention 'in such full, clear, concise, and exact terms as to enable any person skilled in the art … to make and use the same ….' 35 U.S.C. § 112, para. 1." *Rasmusson v. SmithKline Beecham Corp.*, 413 F.3d 1318, 1322 (Fed. Cir. 2005).

> Factors to be considered in determining whether a disclosure would require undue experimentation … include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

In re Wands, 858 F.2d 731, 737 (Fed. Cir. 1988).

The Examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention. *See In re Wright*, 999 F.2d 1557, 1561-62 (Fed. Cir. 1993) (Examiner must provide a reasonable explanation as to why the scope of protection provided by a claim is not adequately enabled by the disclosure).

Analysis

The Specification teaches, and the Caulfield Declaration demonstrates, that Mutacin I is an effective antibiotic with activity against a variety of gram positive microorganisms (FF 3-5, 9-10).

The Examiner, while arguing that the full scope of the claim is not enabled, cites no art, evidence or specific scientific reasoning to suggest unpredictability in determining whether mutacin I will have antibiotic activity against any particular gram positive microorganism (FF 1, 2, 7, 8).

Balancing the *Wands* factors, we agree with Appellants that undue experimentation would not have been required to make and use the claimed invention. There is no evidence to suggest that mutacin I would fail to function as an antibiotic and there is no reasonable reason to doubt that mutacin I would be effective against a variety of gram positive organisms (FF 9-10). The Examiner has not satisfied the initial burden to establish a basis to question the enablement of the claimed invention.

The Examiner's position that the Specification cannot teach how to use the claimed method unless it teaches solutions to all possible species and all possible gram positive organisms is contrary to controlling case law. *See, e.g., In re Brana*, 51 F.3d 1560, 1568 (Fed. Cir. 1995). A claim may encompass inoperative embodiments and still meet the enablement

requirement of 35 U.S.C. § 112, first paragraph. *See Atlas Powder Co. v. E.I. Du Pont De Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984), *In re Angstadt*, 537 F.2d 498, 502-3, (CCPA 1976), *In re Cook*, 439 F.2d 730, 732 (CCPA 1971).

Conclusion of Law

Appellants have demonstrated that the Examiner erred in finding that it would have required undue experimentation to treat or prevent gram-positive infections in a subject using the peptide of SEQ ID NO: 2.

We reverse the rejection of claims 9-28 under 35 U.S.C. § 112, first paragraph, enablement.

B. 35 U.S.C. § 102(b) over Ikeda

The Examiner finds that "Ikeda et al teach that when water or diet containing the bacteriocin from Streptococcus mutans was administered to animals the caries score of these animals was found to be significantly reduced" (Ans. 7). The Examiner finds that the "amino acid sequence as set forth in SEQ ID NO: 2 would be inherent in the teachings of the prior art" (Ans. 8).

Appellants contend that "the protein bacteriocin C3603 is not equivalent to the protein of SEQ ID No: 2 described in the present specification and included in claims 9 and 10. For example, the molecular weight of bacteriocin C3603 is cited as 4800 Daltons (Ikeda et al., Abstract) which contrasts with the smaller size of the protein of SEQ 1D No: 2 described in the present specification" (App. Br. 8).

In view of these conflicting positions, we frame the anticipation issue before us as follows:

Have Appellants demonstrated that the Examiner erred in finding that the Ikeda teaches a bacteriocin which inherently comprises SEQ ID NO: 2?

Findings of Fact

11. Ikeda teaches that "[b]acteriocin C3603 . . . was subjected to . . . electrophoresis . . . and a single band was detected by protein stain . . . The molecular weight value of 4,800 . . . was obtained by sedimentation equilibrium analysis" (Ikeda 863, col. 1).

12. Ikeda teaches that "[p]reliminary composition studies indicate that bacteriocin C3603 contains aspartic acid, threonine, serine, glutamic acid, glycine, alanine, valine, methionine, isoleucine, tyrosine, phenylalanine, tryptophan, lysine, and arginine" (Ikeda 866, col. 1).

13. The Specification teaches that for mutacin I, the "estimated molecular weight was 2364 Da" (Spec. 7, l. 13).

14. SEQ ID NO: 2 of the Specification is reproduced below:

<210> 2
<211> 24
<212> PRT
<213> Streptococcus mutans

<400> 2

```
Phe Ser Ser Leu Ser Leu Cys Ser Leu Gly Cys Thr Gly Val Lys Asn
1               5                  10                  15

Pro Ser Phe Asn Ser Tyr Cys Cys
            20
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Principles of Law

"[A]nticipation of a claim under § 102 can be found only if the prior art reference discloses every element of the claim …." *In re King*, 801 F.2d 1324, 1326 (Fed. Cir. 1986) (*citing Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458 (Fed. Cir. 1984)).

"[A]bsence from the reference of any claimed element negates anticipation." *Kloster Speedsteel AB v. Crucible, Inc.*, 793 F.2d 1565, 1571 (Fed. Cir. 1986).

"If the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if that element is 'inherent' in its disclosure." *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *Id.* (*quoting Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991)) (internal quotation marks and citations omitted).

Analysis

Comparison of the amino acid composition of SEQ ID NO: 2 with the amino acid composition of bacteriocin C3603 of Ikeda shows that SEQ ID NO: 2 contains the amino acids leucine, cystine, asparagine, and proline while bacteriocin C3603 does not contain these amino acids.

At a minimum, if the bacteriocin C3603 comprised SEQ ID NO: 2, it would need to comprise all of the amino acids found in SEQ ID NO: 2. As it does not, the Examiner has not established that bacteriocin C3603 may comprise SEQ ID NO: 2.

The Examiner misunderstood this point of Appellants, as shown by the Examiner's statement that "the additional amino acids comprised in the bacteriocin of the prior art does not mean that the protein as set forth in SEQ ID NO: 2 is not inherently present" (Ans. 16). It is not that the prior art has *additional* amino acids, but rather that the prior art bacteriocin C3603 *lacks*

amino acids found in SEQ ID NO: 2 and cannot therefore comprise SEQ ID NO: 2.

Consequently, since bacteriocin 3603 *cannot* comprise SEQ ID NO: 2 because it does not contain leucine, cysteine, asparagine or proline, all amino acids found in SEQ ID NO: 2, Ikeda does not anticipate claims 9 and 10 either expressly or inherently.

Conclusion of Law

Appellants have demonstrated that the Examiner erred in finding that Ikeda teaches a bacteriocin which inherently comprises SEQ ID NO: 2.

We reverse the rejection of claims 9-10 under 35 U.S.C. § 102(b) over Ikeda.

C. 35 U.S.C. § 102(b) over Ooshima

The Examiner finds that "Ooshima et al teach that when water or diet containing the bacteriocin from Streptococcus mutans was administered to animals the dental caries of these animals was found to be significantly reduced (see the Abstract). The amino acid sequence as set forth in SEQ ID NO: 2 would be inherent in the teachings of the prior art" (Ans. 8).

Appellants contend that "the two articles, Ikeda et al. and Ooshima et al., refer to the same protein 'bacteriocin C3603'" (App. Br. 9). Appellants contend that "the protein bacteriocin C3603 is not equivalent to the protein of SEQ ID No: 2 described in the present specification and included in claims 9 and 10" (App. Br. 9).

We agree with Appellants that Ooshima teaches that "[b]acteriocin C3603 was isolated from the culture supernatant of *S. mutans* C3603 (serotype *c*) as described previously (7)" (Ooshima 1164). We further agree

that the citation for the method of isolation is to the Ikeda reference discussed above (*see* Ooshima 1172).

Consequently, since bacteriocin 3603 *cannot* comprise SEQ ID NO: 2 because it does not contain leucine, cysteine, asparagine or proline, all amino acids found in SEQ ID NO: 2, Ooshima does not anticipate claims 9 and 10 either expressly or inherently.

We reverse the rejection of claims 9-10 under 35 U.S.C. § 102(b) over Ooshima.

CONCLUSION

In summary, we reverse the rejection of claims 9-28 under 35 U.S.C. § 112, first paragraph, enablement.

We reverse the rejection of claims 9-10 under 35 U.S.C. § 102(b) over Ikeda.

We reverse the rejection of claims 9-10 under 35 U.S.C. § 102(b) over Ooshima.

REVERSED

Ssc:

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